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# Effect of Induced Anxiety on Test Performance Among Secondary School Students

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## INTRODUCTION

Educational system is examination oriented, not only in Nigeria but in most of the countries the world over. The examination achievement pressure due to one reason or the other is almost universally felt by the school and university going population in Nigeria. Because of the close connection between job attainment and passing of examination, the average parent is more interested in his child passing examination than anything else. Neither the rhetorics which tend to characterize the responses of the Ministry of Education Officials, nor buck passing as is customary with teachers' and parents' reactions would provide a dependable solution to the problem of children failing in examinations. There are many factors that affect scholastic achievement e.g.

- (a) Intelligence (or abilities)
- (b) Interest
- (c) Achievement motivation
- (d) Socio-economic status, etc.

Some studies such as those by Alam (1975) and Seth (1965) have been carried out on these factors. However, among the non-cognitive factors anxiety is an important factor that needs investigation since it has been shown that examination situation induces anxiety (Sarason, 1973 & 1975).

There is related literature available that also supports the theoretical consideration that anxiety affects the achievement. There are studies by Macandless & Castanda (1956) titled Anxiety in Children's School Achievement and Intelligence, Sarason et al (1960) which shows that there is a negative relationship between anxiety scores and achievement scores. There are also studies by Lynn (1956) and Levy (1943) which indicate a positive relationship up to a certain extent between anxiety scores and achievement scores. Pandit (1969) in India also studied the role of anxiety in academic learning and found that anxiety bore negative relationship to different learning and academic achievement indices. In Nigeria, Omoluabi (1985) has shown that examination stress varies in degrees because of the situation specific nature of test anxiety, that higher levels of test anxiety are manifested when examination is in view than when it is not. He also found that the level of anxiety manifested was related to the different type of examination. In the same study the findings showed that resit examinations

In another recent study Culler & Holahan (1980) studied the role of intellectual ability and study habits in academic performance for low and high anxiety students. Their results showed high test anxious students to have poorer ability and poorer study skills.

Operant learning theory by Skinner (1938) postulates that reward facilitates learning and its retention whereas threat induces different amounts of anxiety among students. The purpose of this study is to test the relationship of anxiety with achievement and to test the reward effects. The study will test the following hypothesis:

Mathematics achievement of three equivalent groups of students differ under three conditions: Incentive, Threat, and Normal and the Incentive group will achieve more than the threat-group.

## METHOD

### Subject

A random sampling procedure was adopted to select the subjects. Three sections of Senior Secondary Two (SS2) of 31 students each were chosen from a boys' Secondary School in Calabar. The mean age of the sample was 18.4 years. The subjects were roughly equivalent in terms of past mathematics achievement, a common mathematics teacher, and general anxiety.

The instructions were of three types, Incentive, Threat, and Normal. These instructions were given to sections A, F and H respectively. The sections were chosen according to the mathematics periods.

### Instruments

Anxiety among subjects was measured using State Trait Anxiety Inventory developed by Spoilberger, Grouch & Lusheme (1970). Its X-1 form was used to measure state anxiety and X-2 form was used to measure general or trait anxiety among students. In both forms there were 20 statements each. Both forms are easy to administer.

Achievement in Mathematics was judged by Achievement Test on Multiplication of Polynomials prepared by Alam (1975). It consisted of 50 items of multiple choice. For example,  $9 + 9 + 9 \dots$  add n times = ? (A)  $9 + n$ , (B)  $9n$  (C)  $9 + 9 + 9 + \dots$  add n times = ? (A)  $9 + n$ , (B)  $9n$  (C)  $9 - n$  (D)  $9/n$  (E) none of these.

### Procedure

Before the commencement of the experiment it was discussed with the teacher who was teaching mathematics to three sections of SS 2 in the school. The instructions for Incentive and Treat groups were decided. Thus the following steps of procedure were adopted to collect the data.

- (i) First day: The mathematics teacher administered the 'General Anxiety Scales' in all the three sections and told the subjects about the test on multiplication of polynomials which was to be administered the next day.
- (ii) Second day: The teacher gave the Incentive instructions, announcing the award of prizes in terms of books for first ten merit subjects to section A and then administered "State Anxiety Scale" on the subjects. After that, the teacher

administered the Achievement Test.

(iii) In the same day at the fourth mathematics period, first instructions for Normal group regarding the nature of the test were given to section F and then both the anxiety scale and achievement test were administered on this section's subjects.

(iv) On the third day, following the same procedure as before, first instructions for Threat group, announcing extra class of one hour after school time for one week for subjects failing in the test, were given to section H and both Test Anxiety Scale and Achievement Test were administered.

(v) Answer sheets of Achievement test and anxiety test and anxiety scales were scored and then analysed to obtain the results.

#### Analysis

In data analysis, the mean scores and standard deviations were calculated from each group on the various variables (age, past achievement, general anxiety and achievement test). The t-test ratio was used to demonstrate the significance of difference between means and the standard deviations of different deviations of different groups for age and past achievement.

#### Results

The results of the data analysis (see Table 1) show that the groups were equated on variables of age and past achievement. However, none of the t-ratios used to find the significance of means and standard deviations were found to be significant.

These groups were also found to be equal on the variable of general anxiety. This was obtained by employing analysis of covariance between general anxiety score and achievement score. This gives  $Ms_y.X (V_y.X) = 21.12$  for among means variance with  $df = 2$  and  $Ms_y.X (V_y.X) = 53.64$  for within group variance with  $df = 89$ . This further gives  $F_{y.X} = 39$  which is not significant, F ratios calculated for X and y scores taken separately, were also not significant. This test gave an overall test of the three treatment means, F test gave the test of achievement score adjusted for test anxiety.

Analysis of variance of X and y taken separately gives F ratios  $F_X = 1.14$  and  $F_y = .64$  which were insignificant, whereas analysis of covariance between test anxiety scores (X) and achievement test scores (y) gives among group variance  $Ms_y.X (V_y.X) = 13.26$ , with  $df = 2$  and within groups variance  $Ms_y.X (V_y.X) = 53.86$  with  $df = 89$ . This gives  $F_{y.X} = 25$ . This F ratio was insignificant. Since the F ratio was insignificant, so also the mean of y adjusted for X was insignificant.

Table 1: Showing Means, S.Ds. and Significance of Difference of Means and S.Ds. of Variables in Different Groups

Sections	Variables	Mean	S.D.	Groups	t-Ratio. for Means	Remark	t-ratio for S.Ds	Remarks
A	Age (in Months)	145.9	5.21	A & F	1.77	Not Significant	0.503	Not Significant
F	Age (in Months)	145.7	5.71	F & H	1.02	"	0.710	"
H	Age (in Months)	145.4	6.49	H & A	1.77	"	1.060	"
A	Past Achievement	11.45	4.29	A & F	1.702	"	0.556	"
F	Past Achievement	11.45	3.88	F & H	0.155	"	0.386	"
H	Past Achievement	11.42	4.16	H & A	1.430	"	0.166	"
F	General Anxiety	40.52	6.34	=	=	"	=	"
H	General Anxiety	41.1	5.75	=	=	"	=	"
A	General Anxiety	42.2	6.26	=	=	"	=	"
H	Test Anxiety	36.58	6.26	=	=	"	=	"
A	Test Anxiety	36.61	6.63	=	=	"	=	"
F	Test Anxiety	39.06	8.58	=	=	"	=	"
H	Achievement Test	31.58	8.91	=	=	"	=	"
	Achievement Test	32.13	6.48	=	=	"	=	"
	Achievement Test	30.00	7.26	=	=	"	=	"

Table 2: Table showing Adjusted y Means

Groups	N	Mx	My	Myx	(Adjusted)
Incentive A	31	36.58	31.58	31.30	
Threat H	31	39.06	30.00	30.54	
Control F	31	36.61	32.13	31.88	

The adjusted y means are given in Table 2, none of the groups were significantly different from others. Furthermore, significance of difference between means of achievement test score of incentive and normal groups were calculated with the help of t ratios to see if both experimental treatments were effective.

The t ratios of Achievement Scores between groups (A x F) Incentive x Normal, Normal x Threat (F x H,) were 6.54, 1.48 and 4.06 respectively,  $t = 2.66$  and  $t = 2.00$  were significant at .01 and .05 levels of significance respectively. Thus, the t ratios for F x H (normal x threat) group was not significant. But the t ratios for groups A x F and H X A were significant at .01 level of confidence. This indicated that there was a significant difference in the means of achievement scores for the three groups.

As for the F ratios for analysis of Covariance that were significant, it showed that if the groups were controlled on the basis of test anxiety score only, there would have been no significant difference among the achievement of the three groups. However, t ratios for significant difference between achievement scores of the three groups showed that there was significant difference at .01 level of significance. Since there was no significant difference in General Anxiety among the three groups, the difference in achievement was due to the induced anxiety which was also proved by analysis of covariance.

In order to test that the achievement of the group that was given incentive instructions was more than the achievement of the group given threat instructions the significance of difference between means of achievement test scores of the two experimental groups was calculated. The t ratio gave significance of difference between means of achievement test scores of the two experimental groups.

The obtained t ratio was 4.06 which was significant at .01 level. Thus the hypothesis was partially retained at .01 level of significance. The two experimental treatments were equally effective, the achievement of the group that was given Incentive instruction was more than the achievement of the group that was given Threat instructions.

## Discussion

The hypothesis was partially retained.

(i) The F ratio of analysis of Covariance between Test Anxiety and Achievement Test Scores were insignificant, while the achievement test score differs significantly at .01 level of significance. Since age, previous achievement, general anxiety and teacher which are some of the variables that can affect achievement scores have been controlled, the significance of difference of means obtained between different groups could be attributed to test anxiety, of different levels in the three groups due to the instructions given before the test. This therefore, would enable us to conclude that test anxiety affects the achievement of students. This finding was in support of earlier results by others especially Sarason et al, (1960) who had reported negative correlation between test anxiety scores and achievement scores of grades, two, three, four and five respectively. McCandless & Castanada (1956) found relationship between children's Manifest Anxiety Scores and Academic Achievement. They insisted that the anxiety score might be useful in the practical work of predicting school achievement of children. Studies by Levy (1945), Lynn (1966), Sinha (1961), Pandit (1969) and Gupta (1980) also support the conclusion that anxiety affects achievement.

(ii) When we analysed the significance of difference between means of achievement scores of the 3 groups, we found that:

(a) the incentive instruction has positive effect on achievement. This is in support of previous finding by Seth (1965) that subjects who were presented the incentives scored higher than those who were not. On the whole the number of students getting more than 80% marks were found to be three and half times more in the Incentive group than in the Normal group. Thus, showing that incentive not only affects the achievement positively but it has much more positive effect on slightly above and average students.

(b) The threat had negative effect on achievement. This finding is in line with earlier theoretical formulation by Blairs et al, (1962) who had quoted "When an instructor deliberately creates an atmosphere filled with tension by such remarks as "

"Don't raise your hand or attempt to ask any questions once this test has begun" or Cheaters will be automatically expelled from the room" students get lower test scores than when the instructor is more pleasant and relaxed. Sarason (1958, 1957, 1975) also judged the attitude of an anxious child and reported, that, "the anxious child having self depreciatory attitude, anticipates failure in the test situation in the sense that he will not meet the standards of performance of others or himself, and experiences the situation as unpleasant, an affective state which signifies conflict between conscious and unconscious tendencies".

(iii) Achievement is not equally affected by three different treatments. This shows that a different amount of anxiety has affected the achievement groups.

In conclusion, the subjects who were presented incentive, scored higher than those who were given threat.

**Recommendation:**

There is the need for schools, teachers and parents to determine the incentive needs of the students and apply them accurately. This can be achieved through well organized counselling services both at school, non Governmental organizations, and voluntary agencies.

In addition, teachers have the responsibility to identify conducive and controllable anxiety situations that encourage learning by the students.

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